functional group relationship of claim 2 into claim 1. In view of these amendments and the following remarks, the Applicant respectfully requests reconsideration of the pending rejections and allowance of claims 1, 3, 5-8 and 11-12, in addition to allowed claims 4 and 9-10.

1. Amended Claim 1 Is Patentable Over Shigeta and JP 59042781.

The Applicant respectfully traverses the § 103(a) rejection of claims 1-3, 5-8 and 11-12 on the grounds that the cited references do not teach or suggest all the features of the present invention recited in independent claim 1, as amended.

Claim 1 has been amended to incorporate the claim 2 limitation "wherein a ratio of an amount of an epoxy group of said epoxy resin to an amount of a hydroxyl group of said phenolic resin in the raw material is adjusted to a value ranging from 0.8 to 1.2" to, as the Examiner has suggested, better identify the relationship which results in minimal gas byproduct. As noted in the present specification, by minimizing byproduct gas in this manner the present invention ensures that its separators are exceptionally strong by avoiding byproduct gas-induced voids within the separators. The Applicant respectfully submits that neither JP 59042781 nor Sandelli teach nor suggest the foregoing aspect of amended claim 1.

As a threshold matter, the Applicant wishes to reiterate its previous argument in the Applicant's July 11, 2001 § 1.116 Response, which is equally applicable when applied to the currently cited references. In the previous argument, the Applicant noted that neither Shigeta nor JP 59042781 mentioned the problems of reaction byproduct gas and void generation, and that Shigeta taught away from the present invention by disclosing material compositions specifically designed to obtain *gas porous* separators, *i.e.*, separators with significant void fractions. Thus, one of ordinary skill would not have looked to Shigeta or JP 59042781 for formulations and methods for void-free separator production. The newly cited reference, Sandelli, is virtually identical to Shigeta in its silence regarding selection and combination of materials to avoid gas formation. Further, like JP 59042781, Sandelli contains no suggestion for setting the ratio of thermosetting resin components between 0.8 to 1.2 to minimize gas and void formation.

Sandelli teaches only the combination of coke particles and a readily carbonizable binder, *e.g.*, thermosetting phenol resins, in certain carbon-to-resin proportions to form a separator. *See, e.g.*, Sandelli at 2:15-22; 4:10-35. Importantly, like Shigeta, Sandelli does not

contain *any* suggestion of selection of materials to avoid undesired void formation. Moreover, there is nothing in either Sandelli or JP 59042781 that teaches or suggests that a multi-part resin mixture such as in the present invention could be successfully substituted for its disclosed single-resin-type separator. Accordingly, the Applicant respectfully maintains that, like the combination of Shigeta and JP 59042781, there is no suggestion to combine Sandelli and JP 59042781, nor a reasonable expectation of success of such a combination.

Next, the Applicant respectfully suggests that the Examiner has misapprehended the point of the Applicant's prior argument that JP 59042781 does not teach or suggest the claimed epoxy resin and phenol resin combination. In addressing the Applicant's April 4, 2002 Remarks, the Examiner states that Sandelli is cited for teaching the formation of a separator by molding carbon particles and a binder, where the binder is a phenol resin, and that JP 59042781 teaches the mixing of carbon powder, an epoxy resin and a phenolic resin. The June 6, 2002 Final Office Action goes on to maintain that, contrary to the Applicant's argument, "the phenol resin initial condensation group with an epoxy group is considered an epoxy," apparently because "[t]he instant claims make no specific limitations to the epoxy." June 6, 2002 Final Office Action at 6.

First, the Applicant notes that contrary to the assertion, claim 1 explicitly identifies that the epoxy resin and the phenol resins are separate and different constituents (a well-understood distinction in the art). The pertinent method step recites, in part: "preparing a raw material by mixing a carbon, an epoxy resin and a phenolic resin, *wherein said phenolic resin is different from said epoxy resin.*" Thus, there should be no question when reading the claims, particularly when read in view of the accompanying specification, that separate phenol and epoxy resin materials are required.

Second, the Applicant maintains that the mere presence of an epoxy group on a phenol resin does not transform the phenol resin into an epoxy resin, and nothing in JP 59042781 suggests otherwise. In fact, the Abstract of JP 59042781 is consistent with Applicant's position.

In the Purpose section of its Abstract, JP 59042781 refers to a separator "using as a binder a mixture resin consisting of a phenol polymer and a phenol resin initial condensation product which has an epoxy group." In the very next sentence (first sentence of the Constitution section), the Abstract continues to refer to the resin portion of the binder mixture as a *phenol* resin -- with no further discussion of the epoxy group, let alone any suggestion

that there is any mixture of combination of a phenol resin and an epoxy resin as in the present invention. Indeed, in this latter sentence the Abstract refers to the phenol resin by a name associated by those skilled in the art solely with phenol resins, not epoxy resins: "a *novolak-type phenol resin* initial condensation product." Thus, the Applicant respectfully maintains that JP 59042781 does not teach the combination of a phenol resin and an epoxy resin, and that therefore (assuming *arguendo* that there even was some suggestion to combine Sandelli and JP 59042781) JP 59042781 does not cure the deficiency of Sandelli noted by the Examiner, its failure to teach a process for mixing epoxy resins and phenol resins to form a separator.

Because neither Sandelli nor JP 59042781, either alone or in combination, teach or suggest the foregoing feature recited in amended claim 1, claim 1 and its dependent claims 3, 5-8 and 11-12 are patentable over these references under § 103(a). The Applicant therefore respectfully requests entry of the foregoing amendments and reconsideration and withdrawal of the pending § 103(a) rejections of claims 1, 3, 5-8 and 11-12.

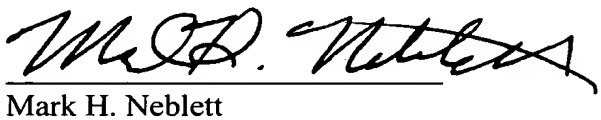
Conclusion

In view of the foregoing amendments and remarks, it is respectfully submitted that entry of the proposed amendments would place the presently pending claims in condition for allowance. The Applicant therefore earnestly solicits entry of the amendments and issuance of a Notice of Allowance for claims 1 and 3-12.

The Examiner is invited to contact the undersigned to discuss any matter concerning this application.

The Office is hereby authorized to charge any additional fees under 37 C.F.R. § 1.16 or § 1.17 or credit any overpayment to Deposit Account No. 11-0600.

Respectfully submitted,



Dated: July 24, 2002

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MARKED UP VERSION OF AMENDMENTS

IN THE CLAIMS:

1. (Thrice amended) A method of manufacturing a separator for a fuel cell comprising:

preparing a raw material by mixing a carbon, an epoxy resin and a phenolic resin, wherein said phenolic resin is different from said epoxy resin, and further wherein [an amount of a hydroxyl group of said phenolic resin in the raw material mixture is sufficient to react with an amount of an epoxy group of said epoxy resin in the raw material mixture] a ratio of an amount of an epoxy group of said epoxy resin to an amount of a hydroxyl group of said phenolic resin in the raw material is adjusted to a value ranging from 0.8 to 1.2 such that generation of a reaction byproduct gas is minimized;

charging the raw material into a predetermined mold; and

heat press forming the raw material charged into the mold.

IN THE SPECIFICATION:

Amended paragraph beginning at page 27, line 6:

-- Further, according to the method of a separator for a fuel cell of the present embodiment, the scaly natural graphite powder, i.e., the carbon powder, is used as the raw material, the amount of the binder can be reduced as compared with a case of using many kinds of carbon powder. That is, each particle constituting the scaly natural graphite powder that a thin piece, the scaly natural graphite powder itself exhibits the adhering force. Therefore the amount of the binder added for giving an adhering force to the carbon powder constituting the separator can be reduced. If the powder having average particle size ranging from 5 to 50 μm [m] and particle size distribution ranging from 1 to 200 μm [m] is used as the carbon powder, the necessary amount of the binder can be reduced compared to the case where the carbon powder having finer particles is used. Since the thermosetting resin used as the binfer has no conductivity, only a small amount of the binder is required to be added to the raw material. As a result, conductivity of the manufactured separator can be improved. The aforementioned range of the particle constituting the carbon powder is selected such that the carbon powder and the binder can be uniformly mixed. --